

Amendments to the Claims

The following listing of claims will replace all prior versions, and listings, of claims in the present application:

1. (Previously Presented) A solid corrosion-inhibiting seal formed on a coating selected from anodic coatings, phosphating coatings, or black oxide coatings, the solid corrosion-inhibiting seal comprising cobalt, wherein the cobalt is trivalent cobalt, tetravalent cobalt, or combinations thereof, and a valence stabilizer combined to form a cobalt/valence stabilizer complex within the solid corrosion-inhibiting seal, and wherein the cobalt/valence stabilizer complex has a solubility in water of between about 5×10^{-1} and about 1×10^{-5} moles per liter of cobalt at about 25°C and about 760 Torr.
2. (Cancelled)
3. (Original) The corrosion-inhibiting seal of claim 2 wherein the solubility of the cobalt/valence stabilizer complex in water is between about 5×10^{-2} and about 5×10^{-5} moles per liter of cobalt at about 25°C and about 760 Torr.
4. (Original) The corrosion-inhibiting seal of claim 1 wherein there is an electrostatic barrier layer around the cobalt/valence stabilizer complex in aqueous solution.
5. (Original) The corrosion-inhibiting seal of claim 1 wherein the cobalt/valence stabilizer complex acts as an ion exchange agent towards corrosive ions.
6. (Previously Presented) The corrosion-inhibiting seal of claim 1 wherein the anodic coatings, phosphating coatings, or black oxide coatings comprise a compound selected from

Official Amendment

Serial No. – 10/038,150
Docket No. – UVD 0299 PA

oxides, hydroxides, phosphates, carbonates, oxalates, silicates, aluminates, borates, and polymers, and combinations thereof.

7. (Previously Presented) The corrosion-inhibiting seal of claim 1 wherein the valence stabilizer is selected from an inorganic valence stabilizer.

8. (Original) The corrosion-inhibiting seal of claim 7 wherein the valence stabilizer is the inorganic valence stabilizer selected from molybdates, tungstates, vanadates, niobates, tantalates, tellurates, periodates, iodates, carbonates, antimonates, stannates, titanates, zirconates, hafnates, bismuthates, germanates, arsenates, phosphates, borates, aluminates, and silicates, and combinations thereof.

9. (Original) The corrosion-inhibiting seal of claim 8 wherein the valence stabilizer is the inorganic valence stabilizer selected from molybdates, tungstates, vanadates, niobates, tantalates, tellurates, periodates, iodates, carbonates, antimonates, and stannates, and combinations thereof.

10. (Original) The corrosion-inhibiting seal of claim 8 wherein the cobalt/valence stabilizer complex has a central cavity containing a cobalt ion and an additional ion.

11. (Original) The corrosion-inhibiting seal of claim 10 wherein the additional ion is B^{+3} , Al^{+3} , Si^{+4} , P^{+5} , Ti^{+4} , V^{+5} , Cr^{+6} , Cr^{+3} , Mn^{+4} , Mn^{+3} , Mn^{+2} , Fe^{+3} , Fe^{+2} , Co^{+2} , Ni^{+2} , Ni^{+3} , Ni^{+4} , Cu^{+2} , Cu^{+3} , Zn^{+2} , Ga^{+3} , Ge^{+4} , As^{+5} , As^{+3} , Zr^{+4} , or Ce^{+4} .

12. (Previously Presented) The corrosion-inhibiting seal of claim 123 wherein the valence stabilizer is the organic valence stabilizer selected from monoamines; diamines; triamines; tetraamines; pentamines; hexamines; five- or six-membered heterocyclic rings containing one to four nitrogen atoms optionally having additional nitrogen, sulfur, or oxygen binding sites; five- or six-membered heterocyclic rings containing one or two sulfur atoms and having additional

Official Amendment

Serial No. – 10/038,150
Docket No. – UVD 0299 PA

nitrogen binding sites; five- or six-membered heterocyclic rings containing one or two oxygen atoms and having additional nitrogen binding sites; (two-, three-, four-, six-, eight-, or ten-)membered nitrogen, nitrogen-sulfur, or nitrogen-oxygen macrocyclics; macrocyclic oligothioketones or dithiolenes; diazenes; thio-, amido-, or imido- derivatives of hypophosphoric, phosphoric, or diphosphoric acids and salts; azo compounds, triazenes, formazans, azines, hydrazones, or Schiff Bases containing at least two azo, imine, or azine groups; azo compounds, triazenes, formazans, azines, hydrazones, or Schiff Bases with ortho- (for aryl) or alpha- or beta- (for alkyl) substitution; oximes; amidines and imido compounds; dithio ligands; amides; amino acids; N-(thio)acyl 7-aminobenzylidenimines; (thio)hydroxamates; alpha- or ortho-aminothio(di)carboxylic acids and salts; (thio)semicarbazones; (thio)acyl hydrazones; (thio)carbazones; silyl aminoalcohols; thioalkyl amines and imines; hydroxyalkyl imines; (thio)aryl amines and imines; guanylureas; guanidinoureas; 2-nitrosophenols; 2-nitrophenols; N-nitrosohydroxylamines; 1,3-monothioketones; monothiomalonamides; 2-thioacylacetamides; 2-acylthioacetamides; dithiodicarbonic diamides; trithiodicarboxylic acids and salts; monothiocarbamates; monothioethers; dithioethers; trithioethers; tetrathioethers; pentathioethers; hexathioethers; disulfides; monophosphines; diphosphines; triphosphines; tetraphosphines; pentaphosphines; hexaphosphines; five- or six-membered heterocyclic rings containing one or two sulfur atoms optionally having additional sulfur, oxygen, or phosphorus binding sites; five- or six-membered heterocyclic rings containing one to three phosphorus atoms optionally having additional phosphorus, nitrogen, oxygen, or sulfur binding sites; five- or six-membered heterocyclic rings containing one to four nitrogen atoms and having additional phosphorus binding sites; five- or six-membered heterocyclic rings containing one or two oxygen atoms and having additional sulfur or phosphorus binding sites; (five-, seven-, or nine-)membered nitrogen, nitrogen-sulfur, or nitrogen-oxygen macrocyclics; (two- to ten-)membered sulfur, sulfur-oxygen, or sulfur-phosphorus macrocyclics, not including oligothioketones or dithiolenes; (two- to ten-)membered phosphorus, nitrogen-phosphorus, or oxygen-phosphorus macrocyclics; thio-, amido-, or imido- derivatives of phosphonic and diphosphonic acids and salts containing no sulfur binding sites; amido-, or imido- derivatives of hypophosphoric,

Official Amendment

Serial No. – 10/038,150
Docket No. – UVD 0299 PA

phosphoric, or diphosphoric acids and salts containing no sulfur binding sites; dithioperoxydiphosphoramides; dithioperoxydiphosphoric acids and salts; monothioperoxydiphosphoramides; monothioperoxydiphosphoric acids and salts; monothiophosphoric acids; phosphoro(dithioperoxoic) acids and salts; azo compounds, triazenes, formazans, azines, or Schiff Bases; silylamines; silazanes; guanidines and diguanidines; pyridinaldimines; hydrazone; hydramides; nitriles; thioureas and thioamides; ureas and biurets; monothio ligands; diketone ligands; dithioacyl disulfides; tetrathioperoxydicarbonic diamides; (hexa-, penta-, or tetra-)thioperoxydicarbonic acids and salts; 1,2-dithiolates; rhodanines; dithiocarbimates; (thio)xanthates; S-(alkyl- or aryl-thio)thiocarboxylic acids and salts; phosphinodithioformates; (thio)borates and (thio)boronates; (thio)arsonic acids and salts; (thio)antimonic acids and salts; phosphine and arsine sulfides or oxides; beta-hydroxyketones and -aldehydes; squaric acids and salts; carbamates and carbimates; carbazates; imidosulfurous diamides; sulfuriimines; thiocarbonyl and mercapto oximes; 2-nitrothiophenols; 2-nitrophenols; acylcyanamides, imidates; 2-amidinoacetates; beta-ketoamines; 3-aminoacrylamides and 3,3-diaminoacrylamides; 3-aminoacrylic acids and salts and 3-hydroxy-3-aminoacrylic acids and salts; 2-nitroanilines; amine and diazine N-oxides; hydrazides and semicarbazides; (amino- or imino-)aryl phosphines; (thio- or hydroxy-)aryl phosphines; arsines; five- or six-membered heterocyclic rings containing one arsenic atom optionally having additional arsenic binding sites; (two- to six-)membered arsenic macrocyclics; selenoethers; five- or six-membered heterocyclic rings containing one or two selenium atoms optionally having additional selenium binding sites; (two- to six-)membered selenium macrocyclics; 1,3-diselenoketones; 1,1-diselenolates; diselenocarbamates; selenophosphoric acids and salts; selenocarbonates; cyanide, isocyanide, and cyanamide ligands; nitrosyl and nitrite ligands; azide ligands; thiolates and selenolates; (thio)cyanate ligands; diene or bicyclic or tricyclic hydrocarbon ligands; and carbonyl, halogen, or hydroxo ligands; and combinations thereof.

13. (Original) The corrosion-inhibiting seal of claim 12 wherein the organic valence stabilizer is selected from monoamines; diamines; triamines; tetraamines; pentamines;

Official Amendment

Serial No. – 10/038,150
Docket No. – UVD 0299 PA

hexamines; five- or six-membered heterocyclic rings containing one to four nitrogen atoms optionally having additional nitrogen, sulfur, or oxygen binding sites; five- or six-membered heterocyclic rings containing one or two sulfur atoms and having additional nitrogen binding sites; five- or six-membered heterocyclic rings containing one or two oxygen atoms and having additional nitrogen binding sites; (two-, three-, four-, six-, eight-, or ten-)membered nitrogen, nitrogen-sulfur, or nitrogen-oxygen macrocyclics; macrocyclic oligothioketones or dithiolenes; diazenes; thio-, amido-, or imido- derivatives of hypophosphoric, phosphoric, or diphosphoric acids and salts; azo compounds, triazenes, formazans, azines, hydrazones, or Schiff Bases containing at least two azo, imine, or azine groups; azo compounds, triazenes, formazans, azines, hydrazones, or Schiff Bases with ortho- (for aryl) or alpha- or beta- (for alkyl) substituted azo compounds, triazenes, formazans, axines, hydrazones, or Schiff Bases; oximes; amidines and imido compounds; dithio ligands; amides; amino acids; N-(thio)acyl 7-aminobenzylidenimines; (thio)hydroxamates; alpha- or ortho-aminothio(di)carboxylic acids and salts; (thio)semicarbazones; (thio)acyl hydrazones; (thio)carbazones; silylaminoalcohols; thioalkyl amines and imines; hydroxyalkyl imines; (thio)aryl amines and imines; guanylureas; guanidinoureas; 2-nitrosophenols; 2-nitrophenols; N-nitrosohydroxylamines; 1,3-monothioketones; monothiomalonamides; 2-thioacylacetamides; 2-acylthioacetamides; dithiodicarbonic diamides; trithiodicarboxylic acids and salts; and monothiocarbamates; and combinations thereof.

14. (Original) The corrosion-inhibiting seal of claim 12 wherein the organic valence stabilizer is the diazene selected from diazeniformimidamides; diazeneformamides; diazeneformothioamides; diazeneacetimidamides; diazeneacetothioamides; diazeneformimidic acids and salts; diazeneacetimidic acids and salts; diazenecarbothioic acids and salts; diazenecarboxidithioic acids and salts; diazeneformimidothioic acids and salts; diazeneformaldehydes; diazeneformothioaldehydes; diazeneacetaldehydes; diazenecacetothioaldehydes; diazenediformamides; diazenediformothioamides; diazenediacetamides; diazenediacetothioamides; diazeneacetimidothioic acids and salts;

Official Amendment

Serial No. – 10/038,150
Docket No. – UVD 0299 PA

imidoyldiazenes; diazenediformimidamides; diazenediacetimidamides; diazenediformimidic acids and salts; diazenediacetimidic acids and salts; diazenediformimidothioic acids and salts; diazenediacetimidothioic acids and salts; diazenedicularbothioic acids; diazenedicularbodithioic acids; diazenecarboxylic acids; diazenediformic acids; diazenecacetic acids; diazenediacetic acids; diazenediformaldehydes; diazenediformothioaldehydes; diazenediacetaldehydes; diazenediacetothioaldehydes; and diimidoyldiazenes; and combinations thereof.

15. (Original) The corrosion-inhibiting seal of claim 12 wherein the organic valence stabilizer is the thio-, amido-, or imido- derivatives of hypophosphoric, phosphoric, or diphosphoric acids and salts selected from phosphoramidimidic triamides; phosphoramidimidic acids and salts; phosphorodiamidimidic acids and salts; phosphorodiamidimidothioic acids and salts; phosphoramidimidothioic acids and salts; phosphoramidimidodithioic acids and salts; phosphoramidimidodithioic acids and salts; (di- or mono-)thiophosphoric acids and salts; (di- or mono-)thiophosphoramides; phosphoramidic acids and salts; phosphorimidic acids and salts; (di- or mono-)thioimidodiphosphoric acids and salts; (di- or mono-)thiohydrazidodiphosphoric acids and salts; (di- or mono-)thioimidodiphosphoramides; (di- or mono-)thiohydrazidodiphosphoramides; phosphoric triamides; (di- or mono-)thiodiphosphoramides; (di- or mono-)thiodiphosphoric acids and salts; (tetra-, tri-, di-)thiophosphoric acids and salts; phosphoro(dithioperoxo)(mono-, di-, or tri-)thioic acids and salts; phosphorimido(mono-, di-, or tri-)thioic acids and salts; phosphorothioic triamides; phosphoramido(mono, di- or tri-)thioic acids and salts; and phosphorodiamido(mono, di- or tri-)thioic acids and salts; and combinations thereof.

16. (Original) The corrosion-inhibiting seal of claim 12 wherein the organic valence stabilizer is a substituent for the ortho- (for aryl) or alpha- or beta- (for alkyl) substituted azo compounds, triazenes, formazans, azines, hydrazones, or Schiff Bases selected from amino; imino; oximo; diazeno; hydrazido; thiol; mercapto; thiocarbonyl; hydroxy; carbox; and carbonyl substituents, and combinations thereof.

Official Amendment

Serial No. – 10/038,150
Docket No. – UVD 0299 PA

17. (Original) The corrosion-inhibiting seal of claim 12 wherein the organic valence stabilizer is the oxime selected from monooximes; dioximes; carbonyl oximes; imine oximes; hydroxy oximes; amino oximes; amido oximes; hydrazone oximes; and azo oximes; and combinations thereof.

18. (Original) The corrosion-inhibiting seal of claim 12 wherein the organic valence stabilizer is the amidine and imido compound selected from amidines; diamidines; biguanides; biguanidines; diaminomethanes; imidoguanidines; amidinoguanidines; diformamidine oxides, sulfides, and disulfides; imidodicarbonimidic acids and salts; diimidodicarbonimidic acids and salts; thioimidodicarbonimidic acids and salts; thiodiimidodicarbonimidic acids and salts; diimidoylimines; diimidoylhydrazides; imidosulfamides; diimidosulfamides; O-amidinocarbamates; O- or S-amidino(mono-, di-, or peroxy-)thiocarbamates; N-hydroxy(or N,N'-dihydroxy)amidines; and diimidosulfuric acids and salts; and combinations thereof.

19. (Original) The corrosion-inhibiting seal of claim 14 wherein the organic valence stabilizer is the dithio ligand selected from dithioimidodialdehydes; dithiohydrazidodialdehydes; dithioimidodicarbonic acids and salts; dithiohydrazidodicarbonic acids and salts; 1,3-dithioketones; 1,2-dithioketones; dithiomalonamides; 2-thioacylthioacetamides; dithioacyl sulfides; trithiocarbonic diamides; (penta-, tetra-, tri-)thiocarbonic acids and salts; beta-mercaptopthioketones and -aldehydes; N-(aminomethylthiol)thioureas; dithiooxamides; 1,1-dithiolates; (di- or per-)thiomonocarboxylic acids and salts; (tetra- or per-)thiocarboxylic acids and salts; (di-, tri-, or per-)thiocarbonates; dithiocarbamates (including N-hydroxydithiocarbamates and N-mercaptodithiocarbamates); and dithiocarbazates; and combinations thereof.

20. (Original) The corrosion-inhibiting seal of claim 14 wherein the organic valence stabilizer is the amide selected from monoamides; lactams; amidinoamides; guanidinoamides; imidoylamides; polyamides; and polylactams; and combinations thereof.

Official Amendment

Serial No. – 10/038,150
Docket No. – UVD 0299 PA

21. (Original) The corrosion-inhibiting seal of claim 14 wherein the organic valence stabilizer is the thio-, amido-, or imido- derivative of phosphonic and diphosphonic acids and salts selected from phosphonitrile amides; phosphonimidic diamides; phosphonamidimidic acids and salts; phosphonamidimidothioic acids and salts; dithioimidodiphosphonic acids and salts; dithiohydrazidodiphosphonic acids and salts; dithioimidodiphosphonamides; dithiohydrazidodiphosphonamides; dithiodiphosphonamides; dithiodiphosphonic acids and salts; dithioperoxydiphosphonamides; dithioperoxydiphosphonic acids and salts; (di- and tri-)thiophosphonic acids and salts; phosphono(dithioperoxo)thioic acids and salts; phosphono(dithioperoxo)dithioic acids and salts; phosphonimidothioic acids and salts; phosphonimidodithioic acids and salts; phosphonothioic acids and salts; phosphonanidothioic acids and salts; phosphonamidimidodithioic acids and salts; monothioimidodiphosphonic acids and salts; monothiohydrazidodiphosphonic acids and salts; monothioimidodiphosphonamides; monothiohydrazidodiphosphonamides; monothiodiphosphonamides; monothiodiphosphonic acids and salts; monothioperoxydiphosphonamides; monothioperoxydiphosphonic acids and salts; monothiophosphonic acids and salts; and phosphono(dithioperoxoic) acids and salts; and combinations thereof.

22. (Original) The corrosion-inhibiting seal of claim 12 wherein the organic valence stabilizer is the amido-, or imido- derivative of hypophosphoric, phosphoric, or diphosphoric acids and salts containing no sulfur binding sites selected from hypophosphoric acids and salts; hypophosphoramides; imidodiphosphoric acids and salts; hydrazidodiphosphoric acids and salts; imidodiphosphoramides; hydrazidodiphosphoramides; and diphosphoramides; and combinations thereof.

23. (Original) The corrosion-inhibiting seal of claim 12 wherein the organic valence stabilizer is the amido-, or imido- derivative of phosphonic or diphosphonic acids and salts containing no sulfur binding sites selected from imidodiphosphonic acids and salts; hydrazidodiphosphonic acids and salts; imidodiphosphonamides; hydrazidodiphosphonamides;

Official Amendment

Serial No. – 10/038,150
Docket No. – UVD 0299 PA

diphosphonamides; phosphonimidic acids and salts; phosphonamidic acids and salts; and phosphonic diamides; and combinations thereof.

24. (Original) The corrosion-inhibiting seal of claim 12 wherein the organic valence stabilizer is the thiourea and thioamide selected from thioureas; thiocarboxamides; thioacylthioureas, acylthioureas, and thioacylureas; thioaroylthioureas, aroylthioureas, and thioaroylureas; thioimidates; thioguanylureas; guanidinothioureas; amidinothioamides; guanidinothioamides; imidoylthioamides; 3-aminothioacrylamides; thiohydrazides; thiosemicarbazides; (mono- and di-)thiobiurets; (mono- and di-)thioisobiurets; (mono- and di-)thiobiureas; N-(aminomethylol)thioureas; N-(aminomethylthiol)ureas; and beta-mercaptopcarboxamides; and combinations thereof.

25. (Original) The corrosion-inhibiting seal of claim 12 wherein the organic valence stabilizer is the urea and biuret selected from ureas; pseudoureas; biurets, isobiurets; biureas; acylureas; aroylureas; and N-(aminomethylol)ureas; and combinations thereof.

26. (Original) The corrosion-inhibiting seal of claim 12 wherein the organic valence stabilizer is the monothio ligand selected from beta-aminothiones; 3-aminothioacrylic acids and salts; 3-mercaptop-3-aminothioacrylic acids and salts; N-thioacyl benzylidenimines; thioimidodialdehydes; thiohydrazidodialdehydes; thioimidodicarbonic acids and salts; thiohydrazidodicarbonic acids and salts; 1,2-monothioketones; trithioperoxydicarbonic diamides; dithioperoxydicarbonic diamides; dithiodicarbonic acids and salts; trithioperoxydicarbonic acids and salts; beta-hydroxythioketones; beta-hydroxythioaldehydes; beta-mercaptopketones; beta-mercaptopaldehydes; monothiooxamides; beta-mercaptopcarboxylic acids and salts; beta-mercaptopthiocarboxylic acids and salts; beta-hydroxythiocarboxylic acids and salts; S-alkylthiocarboxylic acids and salts; S-arylthiocarboxylic acids and salts; S-alkyldisulfidocarboxylic acids and salts; S-aryldisulfidocarboxylic acids and salts; monothiomonocarboxylic acids and salts; dithiodicarboxylic acids and salts;

Official Amendment

Serial No. – 10/038,150
Docket No. – UVD 0299 PA

monothiocarbonates; monothiocarbazates; monothiocarbimates; mercaptoalcohols; and silylmercaptoalcohols; and combinations thereof.

27. (Original) The corrosion-inhibiting seal of claim 12 wherein the organic valence stabilizer is the diketone ligand selected from imidodialdehydes; hydrazidodialdehydes; imidodicarbonic acids and salts; hydrazidodicarbonic acids and salts; imidodisulfamic acids and salts; imidodisulfuric acids and salts; 1,3-diketones; 1,2-diketones; malonamides; 2-acylacetamides; monothiodicarbonic diamides; monothiodicarbonic acids and salts; dithioperoxydicarbonic acids and salts; trithionic acids and salts; oxamides; and dicarboxylic acids; and combinations thereof.

28. (Original) The corrosion-inhibiting seal of claim 12 wherein the organic valence stabilizer is the S-(alkyl- or aryl-thio)thiocarboxylic acid and salt selected from S-(alkylthio)thiocarboxylic acids and salts; S-(arylthio)thiocarboxylic acids and salts; S,S-thiobisthiocarboxylic acids and salts; S-(alkyldisulfido)thiocarboxylic acids and salts; S-(aryldisulfido)thiocarboxylic acids and salts; and S,S'-disulfidobisthiocarboxylic acids and salts; and combinations thereof.

29. (Original) The corrosion-inhibiting seal of claim 12 wherein the organic valence stabilizer is the phosphine and arsine sulfide or oxide selected from phosphine P-sulfides; aminophosphine sulfides; arsine As-sulfides; aminoarsine sulfides; phosphine P-oxides; aminophosphine oxides; arsine As-oxides; and aminoarsine oxides; and combinations thereof.

30. (Original) The corrosion-inhibiting seal of claim 12 wherein a solubility of the cobalt/valence stabilizer complex in water is adjusted by an addition of a substituent group on the organic valence stabilizer.

Official Amendment

Serial No. – 10/038,150
Docket No. – UVD 0299 PA

31. (Original) The corrosion-inhibiting seal of claim 30 wherein the solubility in water of the cobalt/valence stabilizer complex in water is increased by the addition of the substituent group selected from sulfonate groups (-SO₃⁻), carboxyl groups (-CO₂⁻), hydroxyl groups (-OH), ester groups (-CO₂⁻), carbonyl groups (=C=O), amine groups (-NH₂), nitrosamine groups (=N=N=O), carbonylnitrene groups (-CO-N), sulfoxide groups (=S=O), sulfone groups (=S[=O]₂), sulfinyl groups (-N=S=O), sulfodiimines (=S[=NH]₂), sulfonyl halide groups (-S[=O]₂X), sulfonamide groups (-S[=O]₂NH₂), monohalosulfonamide groups (-S[=O]₂NHX), dihalosulfonamide groups (-S[=O]₂MX₂), halosulfonate groups (-S[=O]₂OX), halosulfonate amide groups (=N-S[=O]₂X), aminosulfonate groups (=N-S[=O]₂OH), iminosulfonate groups (-N[SO₃⁻]₁₋₂), phosphonate groups (-PO₃⁻²), phosphonamide groups (-PO₂NH₂⁻), phosphondiamide groups (-PO[NH₂]₂), aminophosphonate groups (=N-PO₃⁻²), and iminophosphonate groups (-N[PO₃⁻²]₁₋₂), and combinations thereof.

32. (Original) The corrosion-inhibiting seal of claim 30 wherein the solubility in water of the cobalt/valence stabilizer complex in water is decreased by the addition of the substituent group selected from nitro groups (-NO₂), perfluoroalkyl groups (-C_xF_{2x+1}), perchloroalkyl groups (-C_xCl_{2x+1}), nitramine groups (=N-NO₂), thioketone groups (=C=S), sulfenyl halide groups (-S-X), and sulfur dihaloimide groups (-N=SX₂), and combinations thereof.

33. (Original) The corrosion-inhibiting seal of claim 12 wherein an electrostatic barrier layer of the cobalt/valence stabilizer complex is adjusted by an addition of a substituent group on the organic valence stabilizer.

34. (Original) The corrosion-inhibiting seal of claim 33 wherein the electrostatic barrier layer is increased by the addition of the substituent group selected from ketones (=C=O), thioketones (=C=S), amides (-C[=O]-NR₂), thioamides (-C[=S]-NR₂), nitriles or cyano groups, (-CN), isocyanides (-NC), nitroso groups (-N=O), thionitroso groups (-N=S), nitro groups (-NO₂), azido groups (-N₃), cyanamide or cyanonitrene groups (=N-CN), cyanate groups (-O-CN),

Official Amendment

Serial No. – 10/038,150
Docket No. – UVD 0299 PA

isocyanate groups (-N=C=O), thiocyanate groups (-S-CN), isothiocyanate groups (-N=C=S), nitrosamine groups (=N-N=O), thionitrosamine groups (=N-N=S), nitramine groups (=N-NO₂), thionitramine groups (=N-NS₂), carbonylnitrene groups (-CO-N), thiocarbonylnitrene groups (-CS-N), sulfenyl halides (-S-X), sulfoxides (=S=O), sulfones (=S[=O]₂), sulfinyl groups (-N=S=O), thiosulfinyl groups (-N=S=S), sulfenyl thiocyanato groups (-S-S-CN), sulfenyl cyanato groups (-S-O-CN), sulfodiimine groups (=S[=NH]₂), sulfur dihaloimido groups (-N=SX₂), sulfur oxide dihaloimido groups (-N=S[=O]X₂), aminosulfur oxide trihalide groups (=N-S[=O]X₃), sulfonyl azide groups (-S[=O]₂N₃), sulfonyl thiocyanate groups (-S[=O]₂SCN), sulfonyl cyanate groups (-S[=O]₂OCN), sulfonyl cyanide groups (-S[=O]₂CN), halosulfonate groups (-S[=O]₂OX), phosphonyl thiocyanate groups (-P[=O]OHSCN), phosphonyl cyanate groups (-P[=O]OHOCN), and phosphonyl cyanide groups (-P[=O]OHCN), and combinations thereof.

35. (Original) The corrosion-inhibiting seal of claim 1 further comprising a solubility control agent.

36. (Original) The corrosion-inhibiting seal of claim 35 wherein the solubility control agent is selected from a cationic solubility control agent and an anionic solubility control agent.

37. (Original) The corrosion-inhibiting seal of claim 36 wherein the solubility control agent is the cationic solubility control agent selected from H⁺, Li⁺, Na⁺, K⁺, Rb⁺, Cs⁺, NH₄⁺, Mg⁺², Ca⁺², Sr⁺², Be⁺², Ba⁺², Y⁺³, La⁺³, Ce⁺³, Ce⁺⁴, Nd⁺³, Pr⁺³, Sc⁺³, Sm⁺³, Eu⁺³, Eu⁺², Gd⁺³, Tb⁺³, Dy⁺³, Ho⁺³, Er⁺³, Tm⁺³, Yb⁺³, Lu⁺³, Ti⁺⁴, Zr⁺⁴, Ti⁺³, Hf⁺⁴, Nb⁺⁵, Ta⁺⁵, Nb⁺⁴, Ta⁺⁴, V⁺⁵, V⁺⁴, V⁺³, Mo⁺⁶, W⁺⁶, Mo⁺⁵, W⁺⁵, Mo⁺⁴, W⁺⁴, Cr⁺³, Mn⁺², Mn⁺³, Mn⁺⁴, Fe⁺², Fe⁺³, Co⁺², Co⁺³, Ni⁺², Ni⁺³, Ni⁺⁴, Ru⁺², Ru⁺³, Ru⁺⁴, Rh⁺³, Ir⁺³, Rh⁺², Ir⁺², Pd⁺⁴, Pt⁺⁴, Pd⁺², Pt⁺², Os⁺⁴, Cu⁺, Cu⁺², Cu⁺³, Ag⁺, Ag⁺², Ag⁺³, Au⁺, Au⁺², Au⁺³, Zn⁺², Cd⁺², Hg⁺, Hg⁺², Al⁺³, Ga⁺³, Ga⁺, In⁺³, In⁺, Ti⁺³, Ti⁺, Ge⁺⁴, Ge⁺², Sn⁺⁴, Sn⁺², Pb⁺⁴, Pb⁺², Sb⁺³, Sb⁺⁵, As⁺³, As⁺⁵, Bi⁺³, Bi⁺⁵, organic compounds containing at least one N⁺ site, organic compounds containing at least one phosphonium site, organic compounds containing at least one arsonium site, organic compounds containing at least one stibonium site,

Official Amendment

Serial No. – 10/038,150
Docket No. – UVD 0299 PA

organic compounds containing at least one oxonium site, organic compounds containing at least one sulfonium site, organic compounds containing at least one selenonium site, organic compounds containing at least one iodonium site, and quaternary ammonium compounds having a formula NR_4^+ , where R is an alkyl, aromatic, or acyclic organic constituent, and combinations thereof.

38. (Original) The corrosion-inhibiting seal of claim 37 wherein the cationic solubility control agent is selected from H^+ , Li^+ , Na^+ , K^+ , Rb^+ , Cs^+ , NH_4^+ , Mg^{+2} , Ca^{+2} , Sr^{+2} , Y^{+3} , La^{+3} , Ce^{+3} , Ce^{+4} , Nd^{+3} , Pr^{+3} , Sc^{+3} , Sm^{+3} , Eu^{+3} , Eu^{+2} , Gd^{+3} , Tb^{+3} , Dy^{+3} , Ho^{+3} , Er^{+3} , Tm^{+3} , Yb^{+3} , Lu^{+3} , Ti^{+4} , Zr^{+4} , Ti^{+3} , Hf^{+4} , Nb^{+5} , Ta^{+5} , Nb^{+4} , Ta^{+4} , Mo^{+6} , W^{+6} , Mo^{+5} , W^{+5} , Mo^{+4} , W^{+4} , Mn^{+2} , Mn^{+3} , Mn^{+4} , Fe^{+2} , Fe^{+3} , Co^{+2} , Co^{+3} , Ru^{+2} , Ru^{+3} , Ru^{+4} , Rh^{+3} , Ir^{+3} , Rh^{+2} , Ir^{+2} , Pd^{+4} , Pt^{+4} , Pd^{+2} , Pt^{+2} , Cu^+ , Cu^{+2} , Cu^{+3} , Ag^+ , Ag^{+2} , Ag^{+3} , Au^+ , Au^{+2} , Au^{+3} , Zn^{+2} , Al^{+3} , Ga^{+3} , Ga^+ , In^{+3} , In^+ , Gc^{+4} , Ge^{+2} , Sn^{+4} , Sn^{+2} , Sb^{+3} , Sb^{+5} , Bi^{+3} , Bi^{+5} , organic compounds containing at least one N^+ site, organic compounds containing at least one phosphonium site, organic compounds containing at least one stibonium site, organic compounds containing at least one oxonium site, organic compounds containing at least one sulfonium site, organic compounds containing at least one iodonium site, and quaternary ammonium compounds having a formula NR_4^+ , where R is an alkyl, aromatic, or acyclic organic constituent, and combinations thereof.

39. (Original) The corrosion-inhibiting seal of claim 36 wherein the solubility control agent is the anionic solubility control agent selected from fluorotitanates, chlorotitanates, fluorozirconates, chlorozirconates, fluoroniobates, chloroniobates, fluorontantalates, chlorontantalates, molybdates, tungstates, permanganates, fluoromanganates, chloromanganates, fluoroferrates, chloroferrates, fluorocobaltates, chlorocobaltates, fluorozincates, chlorozincates, borates, fluoroborates, fluoroaluminates, chloroaluminates, carbonates, silicates, fluorosilicates, fluorostannates, nitrates, nitrites, azides, cyanamides, phosphates, phosphites, phosphonates, phosphinates, thiophosphates, thiophosphites, thiophosphonates, thiophosphinates, fluorophosphates, fluoroantimonates, chloroantimonates, sulfates, sulfites, sulfonates,

Official Amendment

Serial No. – 10/038,150
Docket No. – UVD 0299 PA

thiosulfates, dithionites, dithionates, fluorosulfates, tellurates, fluorides, chlorides, chlorates, perchlorates, bromides, bromates, iodides, iodates, periodates, heteropolyanions, ferricyanides; ferrocyanides; cyanocobaltates; cyanocuprates; cyanomanganates; cyanates; cyanatoferates; cyanatocobaltates; cyanatocuprates; cyanatomanganates; thiocyanates; thiocyanatoferates; thiocyanatocobaltates; thiocyanatocuprates; thiocyanatomanganates; cyanamides; cyanamidoferates; cyanamidocobaltates; cyanamidocuprates; cyanamidomanganates; nitritoferates; nitritocobaltates; azides; (thio)carboxylates, di(thio)carboxylates, tri(thio)carboxylates, tetra(thio)carboxylates; (thio)phenolates, di(thio)phenolates, tri(thio)phenolates, tetra(thio)phenolates; (thio)phosphonates, di(thio)phosphonates, tri(thio)phosphonates; (thio)phosphonamides, di(thio)phosphonamides, tri(thio)phosphonamides; amino(thio)phosphonates, diamino(thio)phosphonates, triamino(thio)phosphonates; imino(thio)phosphonates, diimino(thio)phosphonates; (thio)sulfonates, di(thio)sulfonates, tri(thio)sulfonates; (thio)sulfonamides, di(thio)sulfonamides, tri(thio)sulfonamides; amino(thio)sulfonates, diamino(thio)sulfonates, triamino(thio)sulfonates; imino(thio)sulfonates, diimino(thio)sulfonates; (thio)borates, di(thio)borates, (thio)boronates; organic silicates; stibonates; cyanides; cyanochromates; cyanonickelates; cyanatchromates; cyanatonickelates; thiocyanatochromates; thiocyanatonickelates; cyanamidochromates; cyanamidonickelates; nitritonickelates; arsonates, diarsonates, triarsonates; organic selenates, diselenates, triselenates; arsenates, arsenites, fluoroarsenates, chloroarsenates, selenates, selenites, fluorothallates, chlorothallates, iodomercury anions, chloromercurates, bromomercurates, osmates, fluoronickelates, chromates, Reinecke's salt, and vanadates, and combinations thereof.

40. (Original) The corrosion-inhibiting seal of claim 39 wherein the anionic solubility control agent is selected from fluorotitanates, chlorotitanates, fluorozirconates, chlorozirconates, fluoroniobates, chloroniobates, fluorontantalates, chlorontantalates, molybdates, tungstates, permanganates, fluoromanganates, chloromanganates, fluoroferates, chloroferrates, fluorocobaltates, chlorocobaltates, fluorozincates, chlorozincates, borates, fluoroborates, fluoroaluminates, chloroaluminates, carbonates, silicates, fluorosilicates, fluorostannates,

Official Amendment

Serial No. – 10/038,150
Docket No. – UVD 0299 PA

nitrates, nitrites, azides, cyanamides, phosphates, phosphites, phosphonates, phosphinites, thiophosphates, thiophosphites, thiophosphonates, thiophosphinites, fluorophosphates, fluoroantimonates, chloroantimonates, sulfates, sulfites, sulfonates, thiosulfates, dithionites, dithionates, fluorosulfates, tellurates, fluorides, chlorides, chlorates, perchlorates, bromides, bromates, iodides, iodates, periodates, heteropolyanions, ferricyanides; ferrocyanides; cyanocobaltates; cyanocuprates; cyanomanganates; cyanates; cyanatoferates; cyanatocobaltates; cyanatocuprates; cyanatomanganates; thiocyanates; thiocyanatoferates; thiocyanatocobaltates; thiocyanatocuprates; thiocyanatomanganates; cyanamides; cyanamidoferates; cyanamidocobaltates; cyanamidocuprates; cyanamidomanganates; nitritoferates; nitritocobaltates; azides; (thio)carboxylates, di(thio)carboxylates, tri(thio)carboxylates, tetra(thio)carboxylates; (thio)phenolates, di(thio)phenolates, tri(thio)phenolates, tetra(thio)phenolates; (thio)phosphonates, di(thio)phosphonates, tri(thio)phosphonates; (thio)phosphonamides, di(thio)phosphonamides, tri(thio)phosphonamides; amino(thio)phosphonates, diamino(thio)phosphonates, triamino(thio)phosphonates; imino(thio)phosphonates, diimino(thio)phosphonates; (thio)sulfonates, di(thio)sulfonates, tri(thio)sulfonates; (thio)sulfonamides, di(thio)sulfonamides, tri(thio)sulfonamides; amino(thio)sulfonates, diamino(thio)sulfonates, triamino(thio)sulfonates; imino(thio)sulfonates, diimino(thio)sulfonates; (thio)borates, di(thio)borates, (thio)boronates; organic silicates; and stibonates; and combinations thereof.

41. (Original) The corrosion-inhibiting seal of claim 1 further comprising a lubricity agent.

42. (Original) The corrosion-inhibiting seal of claim 41 wherein the lubricity agent is selected from molybdenum disulfide, fluorinated hydrocarbons, perfluorinated hydrocarbons, graphite, soft metal, and polymers, and combinations thereof.

43. (Original) The corrosion-inhibiting seal of claim 42 wherein the lubricity agent is the soft metal selected from tin, indium, and silver.

Official Amendment

Serial No. – 10/038,150
Docket No. – UVD 0299 PA

44. (Original) The corrosion-inhibiting seal of claim 1 wherein the corrosion-inhibiting seal has a color.

45. (Original) The corrosion-inhibiting seal of claim 44 further comprising an agent which improves color-fastness of the corrosion-inhibiting seal.

46. (Original) The corrosion-inhibiting seal of claim 45 wherein the agent which improves color-fastness is selected from an active UV blocker and a passive UV blocker.

47. (Original) The corrosion-inhibiting seal of claim 46 wherein the agent which improves color-fastness is the active UV blocker selected from carbon black, graphite, and phthalocyanines.

48. (Original) The corrosion-inhibiting seal of claim 46 wherein the agent which improves color-fastness is the passive UV blocker selected from titanium oxide, tin oxide, lead oxide, silicon oxide, silicates, and aluminosilicates, and combinations thereof.

49. (Original) The corrosion-inhibiting seal of claim 45 wherein the agent which improves color-fastness is an agent which prevents smudging.

50. (Original) The corrosion-inhibiting seal of claim 49 wherein the agent which prevents smudging is selected from phosphoric acid, metaphosphates, orthophosphates, pyrophosphates, and polyphosphates, and combinations thereof.

51. (Original) The corrosion-inhibiting seal of claim 45 wherein the agent which improves color-fastness is a wetting agent.

52. (Original) The corrosion-inhibiting seal of claim 51 further comprising less than about 5 g/L of the wetting agent.

Official Amendment

Serial No. – 10/038,150
Docket No. – UVD 0299 PA

53. (Original) The corrosion-inhibiting seal of claim 51 wherein the wetting agent is a nonionic surfactant.

54-122. (Canceled).

123. (Previously Presented) The corrosion-inhibiting seal of claim 1 wherein the valence stabilizer is selected from an organic valence stabilizer.

124. (Currently Amended) A corrosion-inhibiting seal ~~for a barrier film formed on a coating selected from anodic coatings, phosphating coatings, or black oxide coatings, the solid corrosion-inhibiting seal~~ comprising cobalt, wherein the cobalt is trivalent cobalt, tetravalent cobalt, or combinations thereof, and a valence stabilizer combined to form a cobalt/valence stabilizer complex, wherein the valence stabilizer is selected from molybdates, tungstates, vanadates, niobates, tantalates, tellurates, periodates, iodates, carbonates, antimonates, stannates, titanates, zirconates, hafnates, bismuthates, germanates, arsenates, phosphates, borates, aluminates, and silicates, and combinations thereof, and wherein the cobalt/valence stabilizer complex has a central cavity containing a cobalt ion and an additional ion selected from B^{+3} , Al^{+3} , Si^{+4} , P^{+5} , Ti^{+4} , V^{+5} , V^{+4} , Cr^{+6} , Cr^{+3} , Mn^{+4} , Mn^{+3} , Mn^{+2} , Fe^{+3} , Fe^{+2} , Co^{+2} , Ni^{+2} , Ni^{+3} , Ni^{+4} , Cu^{+2} , Cu^{+3} , Zn^{+2} , Ga^{+3} , Ge^{-4} , As^{+5} , As^{+3} , Zr^{+4} , or Ce^{+4} .

125. (Currently Amended) A corrosion-inhibiting seal ~~for a barrier film formed on a coating selected from anodic coatings, phosphating coatings, or black oxide coatings, the solid corrosion-inhibiting seal~~ comprising cobalt, wherein the cobalt is trivalent cobalt, tetravalent cobalt, or combinations thereof, and a valence stabilizer combined to form a cobalt/valence stabilizer complex, wherein the valence stabilizer is an organic valence stabilizer selected from monoamines; diamines; triamines; tetraamines; pentamines; hexamines; five- or six-membered heterocyclic rings containing one to four nitrogen atoms optionally having additional nitrogen, sulfur, or oxygen binding sites; five- or six-membered heterocyclic rings containing one or two

Official Amendment

Serial No. – 10/038,150
Docket No. – UVD 0299 PA

sulfur atoms and having additional nitrogen binding sites; five- or six-membered heterocyclic rings containing one or two oxygen atoms and having additional nitrogen binding sites; (two-, three-, four-, six-, eight-, or ten-)membered nitrogen, nitrogen-sulfur, or nitrogen-oxygen macrocyclics; macrocyclic oligothioketones or dithiolenes; diazenes; thio-, amido-, or imido-derivatives of hypophosphoric, phosphoric, or diphosphoric acids and salts; azo compounds, triazenes, formazans, azines, hydrazones, or Schiff Bases containing at least two azo, imine, or azine groups; azo compounds, triazenes, formazans, azines, hydrazones, or Schiff Bases with ortho- (for aryl) or alpha- or beta- (for alkyl) substitution; oximes; amidines and imido compounds; dithio ligands; amides; amino acids; N-(thio)acyl 7-aminobenzylidenimines; (thio)hydroxamates; alpha- or ortho-aminothio(di)carboxylic acids and salts; (thio)semicarbazones; (thio)acyl hydrazones; (thio)carbazones; silylaminoalcohols; thioalkyl amines and imines; hydroxyalkyl imines; (thio)aryl amines and imines; guanylureas; guanidinoureas; 2-nitrosophenols; 2-nitrophenols; N-nitrosohydroxylamines; 1,3-monothioketones; monothiomalonamides; 2-thioacylacetamides; 2-acylthioacetamides; dithiodicarbonic diamides; trithiodicarboxylic acids and salts; monothiocarbamates; monothioethers; dithioethers; trithioethers; tetrathioethers; pentathioethers; hexathioethers; disulfides; monophosphines; diphosphines; triphosphines; tetraphosphines; pentaphosphines; hexaphosphines; five- or six-membered heterocyclic rings containing one or two sulfur atoms optionally having additional sulfur, oxygen, or phosphorus binding sites; five- or six-membered heterocyclic rings containing one to three phosphorus atoms optionally having additional phosphorus, nitrogen, oxygen, or sulfur binding sites; five- or six-membered heterocyclic rings containing one to four nitrogen atoms and having additional phosphorus binding sites; five- or six-membered heterocyclic rings containing one or two oxygen atoms and having additional sulfur or phosphorus binding sites; (five-, seven-, or nine-)membered nitrogen, nitrogen-sulfur, or nitrogen-oxygen macrocyclics; (two- to ten-)membered sulfur, sulfur-oxygen, or sulfur-phosphorus macrocyclics, not including oligothioketones or dithiolenes; (two- to ten-)membered phosphorus, nitrogen-phosphorus, or oxygen-phosphorus macrocyclics; thio-, amido-, or imido-derivatives of phosphonic and diphosphonic acids and salts containing no sulfur binding sites;

Official Amendment

Serial No. – 10/038,150
Docket No. – UVD 0299 PA

amido-, or imido- derivatives of hypophosphoric, phosphoric, or diphosphoric acids and salts containing no sulfur binding sites; dithioperoxydiphosphoramides; dithioperoxydiphosphoric acids and salts; monothioperoxydiphosphoramides; monothioperoxydiphosphoric acids and salts; monothiophosphoric acids; phosphoro(dithioperoxoic) acids and salts; azo compounds, triazenes, formazans, azines, or Schiff Bases; silylamines; silazanes; guanidines and diguanidines; pyridinaldimines; hydrazone; hydramides; nitriles; thioureas and thioamides; ureas and biurets; monothio ligands; diketone ligands; dithioacyl disulfides; tetrathioperoxydicarbonic diamides; (hexa-, penta-, or tetra-)thioperoxydicarbonic acids and salts; 1,2-dithiolates; rhodanines; dithiocarbimates; (thio)xanthates; S-(alkyl- or aryl-thio)thiocarboxylic acids and salts; phosphinodithioformates; (thio)borates and (thio)boronates; (thio)arsonic acids and salts; (thio)antimonic acids and salts; phosphine and arsenine sulfides or oxides; beta-hydroxyketones and -aldehydes; squaric acids and salts; carbamates and carbimates; carbazates; imidosulfurous diamides; sulfuriimines; thiocarbonyl and mercapto oximes; 2-nitrothiophenols; 2-nitrophenols; acylcyanamides, imidates; 2-amidinoacetates; beta-ketoamines; 3-aminoacrylamides and 3,3-diaminoacrylamides; 3-aminoacrylic acids and salts and 3-hydroxy-3-aminoacrylic acids and salts; 2-nitroanilines; amine and diazine N-oxides; hydrazides and semicarbazides; (amino- or imino-)aryl phosphines; (thio- or hydroxy-)aryl phosphines; arsenines; five- or six-membered heterocyclic rings containing one arsenic atom optionally having additional arsenic binding sites; (two- to six-)membered arsenic macrocyclics; selenoethers; five- or six-membered heterocyclic rings containing one or two selenium atoms optionally having additional selenium binding sites; (two- to six-)membered selenium macrocyclics; 1,3-diselenoketones; 1,1-diselenolates; diselenocarbamates; selenophosphoric acids and salts; selenocarbonates; cyanide, isocyanide, and cyanamide ligands; nitrosyl and nitrite ligands; azide ligands; thiolates and selenolates; (thio)cyanate ligands; diene or bicyclic or tricyclic hydrocarbon ligands; and carbonyl, halogen, or hydroxo ligands; or combinations thereof; wherein a solubility of the cobalt/valence stabilizer complex in water is decreased by an addition of a substituent group on the organic valence stabilizer, the substituent group selected from nitro groups (-NO₂), perfluoroalkyl groups (-C_xF_{2x+1}), perchloroalkyl groups (-C_xCl_{2x+1}), nitramine

Official Amendment

Serial No. – 10/038,150
Docket No. – UVD 0299 PA

groups (=N-NO₂), thioketone groups (=C=S), sulfenyl halide groups (-S-X), and sulfur dihaloimide groups (-N=SX₂), or combinations thereof.

126. (Previously Presented) A solid corrosion-inhibiting seal formed on a coating selected from anodic coatings, phosphating coatings, or black oxide coatings, the solid corrosion-inhibiting seal comprising cobalt, wherein the cobalt is trivalent cobalt, tetravalent cobalt, or combinations thereof, and a valence stabilizer combined to form a cobalt/valence stabilizer complex within the solid corrosion-inhibiting seal, and wherein the cobalt/valence stabilizer complex is sparingly soluble in water at about 25°C and about 760 Torr.